

northward of areas of low pressure, except on the 23d and 24th, when high pressure and variable winds prevailed. To the westward of the sixty-fifth meridian the following conditions attended the development of fog: 7th, storm central off New England coast, fog to the southward in the trans-Atlantic tracks; 18-19th, storm of considerable strength passed

over the Gulf of Saint Lawrence and Newfoundland, fog off the coast and along the trans-Atlantic tracks between the sixtieth and sixty-fifth meridians; 20th, fog off the coast of Georgia, with easterly winds, and storm central over the Gulf of Mexico; 26-27th, fog off the middle Atlantic coast, storm moving northeast over the south and middle Atlantic states.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for January, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperatures and the departures from the normal are given for stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature show the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above.

The mean temperature was highest over southern Florida, where it rose to 70° at Key West. Along the Atlantic coast south of the thirty-fourth parallel, at stations on the east, middle, and west Gulf coast, over southern California and southwestern Arizona, at San Francisco, Cal., and in the Sacramento Valley between Red Bluff and Sacramento, mean values rising above 50° were reported. The lowest mean temperatures were recorded in Manitoba where they fell below 5°. The mean temperature fell below 10° over northwestern Minnesota, northern Dakota, northeastern Montana, and at stations along or near the eastern limit of the middle plateau region of the Rocky Mountains. To the northward of a line traced from the New England coast north of Boston, Mass., south-southwestward to southern New Mexico, and to the eastward of this line continued irregularly northwestward to north-central California, and thence northward through central Oregon and Washington, the mean temperature fell below 32°.

The mean temperature was generally above the normal along the immediate Pacific coast from British Columbia to Lower California, and over all districts east of the Rocky Mountain regions, except at stations in southern and western Texas, and over eastern and southern Florida, where slight deficiencies were shown. The greatest departures above the normal were noted at stations in northern Minnesota and northern Dakota, and the British Possessions to the northward, where they exceeded 10°, from which region they become gradually less marked eastward and southward. Along the Pacific coast the departures above the normal were very small. Over a greater portion of the Rocky Mountain region the mean temperature was deficient, the greatest departures below the normal occurring in the middle plateau district, where they amounted to more than 5°, the greatest deficiency being noted at Winnemucca, Nev.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Saint Vincent, Minn.....	15.7	Winnemucca, Nev.....	11.4
Duluth, Minn.....	13.6	Salt Lake City, Utah.....	6.6
Bismarck, Dak.....	12.7	Boisé City, Idaho.....	6.1
Escanaba, Mich.....	11.4	El Paso, Tex.....	2.5
Saint Paul, Minn.....	10.2	Santa Fe, N. Mex.....	2.4

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for January, 1889; (4) the departure of the current month from the normal; (5) and

the extreme monthly means for January during the period of observation and the years of occurrence:

State and Station.	County.	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for January.			
						Highest.	Year.	Lowest.	Year.
Arkansas.			Years						
Lead Hill.....	Boone.....	30.6	7	38.1	+7.5	38.5	1882	24.2	1886
California.									
Sacramento.....	Sacramento.....	46.9	23	43.7	-3.2	52.7	1873	39.4	1888
Colorado.									
Fort Lyon.....	Bent.....	23.7	19	19.5	-4.2	32.3	1880	13.0	1875
Connecticut.									
Middletown.....	Middlesex.....	24.1	21	32.6	+8.5	32.6	1889	17.3	1888
Florida.									
Merritt's Island.....	Brevard.....	61.0	6	61.0	0.0	67.1	1885	55.3	1886
Georgia.									
Forayth.....	Monroe.....	47.6	15	49.2	+1.6	59.4	1880	40.8	1884
Illinois.									
Peoria.....	Peoria.....	24.0	33	30.6	+6.6	40.9	1880	13.5	1857
Riley.....	McHenry.....	17.4	33	24.0	+6.6	33.2	1880	5.5	1875
Indiana.									
Vevay.....	Switzerland.....	30.4	23	37.0	+6.6	47.2	1880	23.0	1884
Iowa.									
Cresco.....	Howard.....	8.3	17	17.6	+9.3	26.1	1880	-1.3	1883
Monticello.....	Jones.....	15.5	20	22.3	+6.8	32.9	1880	6.0	1883
Logan.....	Harrison.....	17.5	15	24.1	+6.6	34.4	1880	7.1	1886
Kansas.									
Lawrence.....	Douglas.....	26.3	26	30.3	+4.0	41.2	1880	14.3	1886
Wellington.....	Sumner.....	24.7	9	33.4	+8.7	40.4	1880	17.6	1886
Louisiana.									
Mount Pleasant.....	Tensas.....	47.3	9	47.3	0.0	57.9	1880	38.5	1886
Maine.									
Gardiner.....	Kennebec.....	17.7	48	26.7	+9.0	26.7	1889	7.1	1844
Maryland.									
Cumberland.....	Allegany.....	29.4	30	34.7	+5.3	39.0	1880	19.6	1865 '67
Massachusetts.									
Amherst.....	Hampshire.....	23.1	53	32.3	+9.2	32.3	1889	13.5	1857
Newburyport.....	Essex.....	23.8	13	32.7	+8.9	33.1	1880	13.7	1857
Somerset.....	Bristol.....	25.8	16	34.2	+8.4	35.7	1880	19.4	1888
Michigan.									
Kalamazoo.....	Kalamazoo.....	20.3	13	29.3	+9.0	36.0	1880	14.0	1881
Thornville.....	Lapeer.....	20.8	12	29.0	+8.2	35.6	1880	15.6	1881
Minnesota.									
Minneapolis.....	Hennepin.....	7.8	24	20.2	+12.4	23.2	1880	-4.4	1875
Montana.									
Fort Shaw.....	Lewis & Clarke.....	15.8	19	24.2	+8.4	29.1	1872	-2.2	1875
New Hampshire.									
Concord.....	Merrimack.....	20.6	24	29.2	+8.6	29.2	1889	13.2	1857
New Jersey.									
Moorestown.....	Burlington.....	28.9	15	35.5	+6.6	38.7	1880	22.2	1867
South Orange.....	Essex.....	28.0	18	33.6	+5.6	37.6	1880	23.8	1884
New York.									
Cooperstown.....	Otsego.....	19.8	35	27.0	+7.2	31.6	1880	10.3	1857
Palermo.....	Oswego.....	20.3	35	28.0	+7.7	29.4	1863 '80	11.6	1888
North Carolina.									
Lenoir.....	Caldwell.....	35.5	17	38.1	+2.6	46.0	1880	30.2	1882
Ohio.									
N'th Lewisburgh.....	Champaign.....	27.2	57	33.6	+6.4	41.0	1880	14.0	1856 '57
Wauseon.....	Fulton.....	22.2	19	29.4	+7.2	37.7	1880	12.2	1875
Oregon.									
Albany.....	Linn.....	37.3	11	40.0	+2.7	43.8	1887	22.8	1868
Eola.....	Polk.....	37.3	18	38.0	+0.7	42.7	1874	29.7	1875
Pennsylvania.									
Dyberry.....	Wayne.....	20.4	24	(1)	(1)	30.7	1880	13.9	1865
Grampian Hills.....	Clearfield.....	22.3	24	28.8	+6.5	35.0	1880	16.1	1867
Wellsborough.....	Tioga.....	24.1	9	30.0	+5.9	35.2	1880	19.1	1884
South Carolina.									
Statesburgh.....	Sumter.....	44.1	7	46.8	+2.7	49.8	1882	39.0	1886
Tennessee.									
Austin.....	Wilson.....	36.4	20	40.4	+4.0	53.1	1880	28.2	1884
Milan.....	Gibson.....	32.1	5	39.5	+7.4	39.5	1889	27.5	1886
Texas.									
Fort Concho.....	Tom Green.....	43.3	15	46.3	+3.0	58.5	1880	35.8	1885
New Ulm.....	Austin.....	50.0	15	51.4	+1.4	63.7	1880	34.8	1875
Vermont.									
Stratford.....	Orange.....	14.9	15	25.4	+10.5	25.4	1889	6.9	1888
Virginia.									
Bird's Nest.....	Northampton.....	39.2	20	41.2	+2.0	49.4	1880	33.7	1881
Wytheville.....	Wythe.....	35.6	23	36.0	+0.4	44.0	1880	29.0	1884
West Virginia.									
Helvetia.....	Randolph.....	31.6	11	35.2	+3.6	43.1	1880	26.1	1884
Wisconsin.									
Madison.....	Dane.....	16.4	26	22.6	+6.2	33.6	1880	4.1	1875
Washington.									
Fort Townsend.....	Jefferson.....	39.2	17	38.3	-0.9	55.4	1888	29.6	1869

(1) Report not received.

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperatures for the month were reported along the east coast of southern Florida, and in southeastern Texas west of the coast line, where the values rose above 80°, the highest reading, 88°, being noted at Rio Grande City, Tex. At Kitty Hawk, N. C., at stations in the south Atlantic states, over the southern parts of the eastern and middle Gulf states, and a greater portion of Texas, in the vicinity of Eureka, Cal., and in southern California and southwestern Arizona, the readings rose to, or above, 70°. From northern New England westward to the one hundred and seventh meridian, and in the Rocky Mountain regions west of that longitude southward into New Mexico and Arizona, the maximum temperatures fell below 50°, except in north-central Montana, where 51° and 52° were reported at Fort Assinaboine and Fort Maginnis, respectively. At Albany, N. Y., Saint Paul, and Saint Vincent Minn., and Fort Canby, Wash., the maximum temperatures were higher than for any previous January during the periods of observation, by 3°, 3°, 9°, and 2°, respectively. At Albany the highest temperature previously noted occurred in 1876, at Saint Paul and Saint Vincent in 1885, and at Fort Canby in 1888. The most notable deficiencies were reported along the eastern slope of the Rocky Mountains, where at stations the maximum temperatures were from 20° to 30° below the maximum values for the corresponding month of previous years.

The lowest temperatures occurred in the valley of the Red River of the North, where a reading of -36 was noted at Saint Vincent, Minn. Over northern New England and northern New York, Wisconsin, except near the west coast of Lake Michigan, the upper Mississippi and Missouri valleys north of the forty-first parallel, the plateau regions of the Rocky Mountains southward into central Arizona, except near Salt Lake City, Utah, and in the valleys of the Snake and Columbia rivers, the temperature fell below zero. Unusually low temperatures have not been reported, and the minimum readings were above the lowest values previously reported for January in the several districts as follows: New England 14° to 25°, middle and south Atlantic states 17° to 37°, Gulf states 11° to 25°, Lake region 20° to 31°, Ohio, upper Mississippi, and lower Missouri valleys, and Tennessee 24° to 37°, above the minimum temperatures of 1884; in the middle and northern Rocky Mountain regions, 22° to 44°; on the north Pacific slope, 14° to 32°; on the middle and southern Pacific slopes, and in southern Rocky Mountain regions, generally less than 15°.

The table of comparative maximum and minimum temperatures heretofore published in the REVIEW has been discontinued, as similar data for the regular stations of the Signal Service will be published in the table of miscellaneous meteorological data, commencing with the current month.

RANGES OF TEMPERATURE.

The monthly and the greatest and least daily ranges of temperature at Signal Service stations are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred in the valley of the Red River of the North, where they exceeded 80°. In north-central Montana they were more than 70°, while in northern Vermont, southeastern Iowa, central Colorado, the upper Missouri valley, and at stations in the middle and southern plateau regions they ranged above 60°. The monthly ranges were least over the southern extremity of Florida, west-central California, and the western part of Washington Territory, where they were less than 30°. Along the middle and west Gulf coasts, in southwestern Ohio, in the vicinity of Salt Lake City, Utah, over a greater portion of California and Washington Territory, and in northwestern Oregon, the ranges were less than 40°.

The following are some of the extreme monthly ranges:

Greatest.	Least.
Saint Vincent, Minn.	Pysht, Wash.
Moorhead, Minn.	San Francisco, Cal.
Fort Assinaboine, Mont.	Port Angeles, Wash.
Huron, Dak.	Key West, Fla.
Northfield, Vt.	Cincinnati, Ohio.
Winnemucca, Nev.	Salt Lake City, Utah.

FROST.

Frost occurred in the south Atlantic and Gulf states as follows: 1st, Tex; 2d, Ala., Tex.; 3d, Ala., Ga., La., Miss., S. C., Tex.; 4th, S. C., Tex.; 5th, Ala., La., Miss., Tex.; 6th, Ala., La., Miss., S. C., Tex.; 7th, Ala., Ga., La., Miss., S. C.; 8th, Ala., Ga., S. C.; 9th, Ala., Ga., S. C., Tex.; 10th, Ala., Ga., La., Miss., S. C., Tex.; 11th, Ala., Ga., La., S. C., Tex.; 12th, Ala., Ga., La., Miss., S. C., Tex.; 13th, Ala., Ga., La., Miss., S. C., Tex.; 14th, Ala., Ga., Miss., S. C.; 15th, Ga., S. C., Tex.; 17th, La., Tex.; 18th, 19th, Tex.; 20th, Ala., La., Tex.; 21st, Ala., Ga., La., Miss., Tex.; 22d, Ala., Ga., La., Miss., S. C., Tex.; 23d, Ala., S. C., Tex.; 24th, 25th, 26th, Tex.; 27th, Ala., Tex.; 28th, Ala., Ga., La., Miss., Tex.; 29th, Ala., Fla., Ga., La., Miss., S. C., Tex.; 30th, Ala., Fla., Ga., La., Miss., S. C., Tex.; 31st, Ala., Ga., La., Miss., S. C., Tex.

In South Carolina and Georgia no frost was reported along the immediate coast. In Florida frost was not noted until the 29th, except at Pensacola; it was reported generally throughout the northern half of the state on that and the following date. In Alabama frost was reported frequently during the month in the interior of the state. In Mississippi and Louisiana it was observed on fourteen and seventeen dates, respectively, and was of frequent occurrence along the Mississippi River in the southern parts of the states. In Texas frost was reported on twenty-six dates, but was not noted along the immediate coast, save at Corpus Christi, where it was reported on the 21st. Frost was also reported on the 21st at Rio Grande City. When compared with the preceding month the southern limit of frost in Florida for January, 1889, was about 1° farther north, while in Texas it was extended considerably to southward.

LIMITS OF FREEZING WEATHER.

On chart v are shown the southern and western limits of freezing weather during January, 1889. East of the Rocky Mountains the temperature fell below 32°, except in Florida south of the thirtieth parallel, and at stations on the immediate Gulf coast. On the Pacific coast the temperature fell to 32° at Fort Canby, Wash., while to the southward a line representing the western limit of freezing weather is traced over western California, south of the fortieth parallel, to Los Angeles, and thence southeastward to the southwest portion of Arizona.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for January, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Canby, Fort, Wash.	47.5	42.5	5.0	45.2	43.7
Cedar Keys, Fla.	62.0	50.3	11.7	59.0	57.0
Charleston, S. C.	54.9	51.2	3.7	52.9	50.0
Eastport, Me.	40.6	37.1	3.5	39.1	27.0
Galveston, Tex.	58.3	47.5	10.8	53.8	52.4
Key West, Fla.	76.1	67.1	9.0	71.9	70.3
New York City	38.6	35.2	3.4	36.7	36.2
Pensacola, Fla.	58.7	51.0	7.7	56.2	51.4
Portland, Oregon	42.3	37.7	4.6	39.8	38.6

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for January, 1889, as determined from the reports of nearly 1,500 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data are given, for each